

AMENDMENT TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-19. (canceled)

20. (currently amended) A packaging system for in-situ preparation of a formulation from at least two constituents, in which said at least two constituents are separately stored until said formulation is prepared, wherein said packaging system comprises at least two separate storage chambers for storing said at least two constituents separately and at least one static micromixer for mixing said at least two constituents to prepare the formulation;

wherein said at least one static micromixer comprises at least one component in the form of a disk (1);

wherein said disk (1) is provided with at least one inlet opening (2) disposed in a plane of said disk for introduction of at least one feed stream into a linking channel (3) and with at least one outlet opening (4) disposed in the plane of said disk for outflow of the feed stream into a mixing zone (5), said at least one inlet opening (2) being connected with said at least one outlet opening (4) in a communicating manner via said linking channel (3) which is disposed in the plane of said disk; and

wherein said linking channel (3) is divided once by microstructure units (6) into more than two or more part channels (7) ~~before~~ immediately prior to opening into the mixing zone (5), and each of the part channels (7) has a respective width in a millimeter to sub-millimeter range and said width is smaller than a width of the mixing zone (5).

21. (previously presented) The packaging system as defined in claim 20, wherein the static micromixer comprises a system for conveying the constituents that are kept separated until preparation of the formulation and the static micromixer comprises a

housing (11) with at least two feed stream inlets (12a) for introduction of respective feeds to be mixed and with at least one product stream outlet (16) for a product stream.

22. (previously presented) The packaging system as defined in claim 21, wherein the static micromixer comprises a plurality of said disks (1) arranged in a stack in which said disks are superposed over each other so that subsidiary channels communicating with said at least two feed stream inlets (12a) are formed by said at least one inlet opening (2) of each of the said disks and the mixing zone (5) of said disks together form a main channel connected with the at least one product stream outlet (16) for carrying away mixed product, and wherein the main channel and the subsidiary channels extend through said stack of said disks.

23. (previously presented) The packaging system as defined in claim 20, wherein the width of each of the part channels (7) is from 1 μm to 2 mm at an opening thereof into said mixing zone (5);

and/or a ratio of a largest width of the linking channel (3) and/or a width of the at least one inlet opening (2) to the width of each of the part channels (7) is greater than 2;

and/or a ratio of the length of each of the part channels (7) to the width of each of the part channels is from 1:1 to 20:1;

and/or a ratio of the width of the mixing zone (5) to the width of each of the part channels (7) is greater than 2.

24. (previously presented) The packaging system as defined in claim 20, wherein the at least one disk (1) additionally has at least one flow-through opening (9).

25. (previously presented) The packaging system as defined in claim 24, wherein said at least one inlet opening (2), said at least one flow-through opening (9) or said mixing zone (5) is enclosed by the plane of said disk, and the linking channel (3) is formed by an indentation in said disk.

26. (previously presented) The packaging system as defined in claim 24, wherein said at least one inlet opening (2), said at least one flow-through opening (9) or said mixing zone (5) is arranged at an edge of said disk or as a recess in an edge of said disk.

27. (previously presented) The packaging system as defined in claim 20, wherein said at least one inlet opening (2) of said disk (1) comprises respective inlet openings for fluid streams, and said respective inlet openings are connected by corresponding linking channels (3) with said mixing zone (5).

28. (previously presented) The packaging system as defined in claim 20, wherein said at least one outlet opening (4) comprises respective outlet openings arranged on a circular line.

29. (previously presented) The packaging system as defined in claim 20, wherein said disk (1) is provided with additional through-going openings (12) and with additional part channels (13) that are integrated into the microstructure units (6) and separated from the part channels (7).

30. (currently amended) The packaging system as defined in claim 22, wherein either the linking channels (3) of the disks (1) in said stack are formed by indentations in the disks and the linking channels (3) are divided by microstructure units (6) disposed on the disks (1) into said part channels (7) prior to opening into the mixing zone (5), or the linking channels (3) of the disks (1) are formed by recesses in the disks (1) of said stack, the disks are arranged as intermediate disks between a cover disk and a bottom disk, and the linking channels (3) are divided into said more than two part channels (7) by microstructure units (6) disposed on the cover disks and/or bottom disks immediately prior to opening into the mixing zone (5).

31. (previously presented) The packaging system as defined in claim 20, wherein in the mixing zone (5) is filled by a molded element closing off said at least one outlet opening (4) in an idle state, and said molded element is entirely or partly removed from the mixing

zone (5) during operation, thereby entirely or partly opening the at least one outlet opening (4).

32. (withdrawn) An in-situ method for preparing a formulation from at least two constituents prior to use of the formulation, said method comprising the steps of:

a) providing a packaging system comprising at least two separate storage chambers for separately storing said at least two constituents and at least one static micromixer for mixing said at least two constituents to prepare said formulation;

b) storing at least two constituents separately in said at least two separate storage chambers until immediately prior to the mixing; and

c) mixing the at least two constituents to form the formulation immediately by means of the at least one static micromixer;

wherein said at least one static micromixer is provided with at least one component in the form of a disk (1);

wherein said disk (1) is provided with at least one inlet opening (2) disposed in a plane of said disk for introduction of at least one feed stream into a linking channel (3) and with at least one outlet opening (4) disposed in the plane of said disk for outflow of the feed stream into a mixing zone (5), said at least one inlet opening (2) being connected with said at least one outlet opening (4) in a communicating manner via said linking channel (3) which is disposed in the plane of said disk; and

wherein said linking channel (3) is divided into two or more part channels (7) by microstructure units (6) before opening into the mixing zone (5), and each of the part channels (7) has a respective width in a millimeter to sub-millimeter range that is smaller than a width of the mixing zone (5).

33. (withdrawn) The method as defined in claim 32, wherein the at least one feed stream has a flow rate into the mixing zone (5) that is greater than a flow rate of a product stream within the mixing zone (5).

34. (withdrawn) The method as defined in claim 32, wherein the formulation is a microemulsion or a nanoemulsion.

35. (withdrawn) The method as defined in claim 32, wherein the static micromixer comprises a system for conveying the constituents that are kept separated until preparation of the formulation and the static micromixer comprises a housing (11) with at least two feed stream inlets (12a) for introduction of respective feeds to be mixed and with at least one product stream outlet (16) for a product stream.

36. (withdrawn) The method as defined in claim 35, wherein the static micromixer comprises a plurality of said disks (1) arranged in a stack in which said disks are superposed over each other so that subsidiary channels communicating with said at least two feed stream inlets (12a) are formed by said at least one inlet opening (2) of each of the said disks and the mixing zone (5) of said disks together form a main channel connected with the at least one product stream outlet (16) for carrying away mixed product, and wherein the main channel and the subsidiary channels extend through said stack of said disks.

37. (withdrawn) The method as defined in claim 32, wherein the width of each of the part channels (7) is from 1 μm to 2 mm at an opening thereof into said mixing zone (5);

and/or a ratio of a largest width of the linking channel (3) and/or a width of the at least one inlet opening (2) to the width of each of the part channels (7) is greater than 2;

and/or a ratio of the length of each of the part channels (7) to the width of each of the part channels is from 1:1 to 20:1;

and/or a ratio of the width of the mixing zone (5) to the width of each of the part channels (7) is greater than 2.

38. (withdrawn) The method as defined in claim 32, wherein the at least one disk (1) additionally has at least one flow-through opening (9).

39. (withdrawn) The method as defined in claim 38, wherein said at least one inlet opening (2), said at least one flow-through opening (9) or said mixing zone (5) is enclosed

by the plane of said disk, and the linking channel (3) is formed by an indentation in said disk.

40. (withdrawn) The method as defined in claim 38, wherein said at least one inlet opening (2), said at least one flow-through opening (9) or said mixing zone (5) is arranged at an edge of said disk or as a recess in an edge of said disk.

41. (withdrawn) The method as defined in claim 32, wherein said at least one inlet opening (2) of said disk (1) comprises respective inlet openings for fluid streams, and said respective inlet openings are connected by corresponding linking channels (3) with said mixing zone (5).

42. (withdrawn) The method as defined in claim 32, wherein said at least one outlet opening (4) comprises respective outlet openings arranged on a circular line.

43. (withdrawn) The method as defined in claim 32, wherein said disk (1) is provided with additional through-going openings (12) and with additional part channels (13) that are integrated into the microstructure units (6) and separated from the part channels (7).

44. (withdrawn) The method as defined in claim 34, wherein either the linking channels (3) of the disks (1) in said stack are formed by indentations in the disks and the linking channels (3) are divided by microstructure units (6) disposed on the disks (1) into said part channels (7) prior to opening into the mixing zone (5), or the linking channels (3) of the disks (1) are formed by recesses in the disks (1) of said stack, the disks are arranged as intermediate disks between a cover disk and a bottom disk, and the linking channels (3) are divided into said part channels (7) by microstructure units (6) disposed on the cover disks and/or bottom disks prior to opening into the mixing zone (5).

45. (withdrawn) The method as defined in claim 32, wherein in the mixing zone (5) is filled by a molded element closing off said at least one outlet opening (4) in an idle state,

and said molded element is entirely or partly removed from the mixing zone (5) during operation, thereby entirely or partly opening the at least one outlet opening (4).

46. (withdrawn) The method as defined in claim 32, wherein one of the at least two constituents is a single aqueous liquid phase and the other is a hydrophobic liquid phase or a liquid phase containing a water-sensitive substance; or the at least two constituents comprise substances that react chemically or physically modify mixture consistence when coming into contact with each other.

47. (withdrawn) The method as defined in claim 32, wherein said formulation is at least one member selected from the group consisting of colorants, adhesives, foodstuffs, pharmaceutical agents, cosmetic agents, building materials, cleaning agents.

48. (withdrawn) The method as defined in claim 32, wherein said formulation is an emulsion-forming preparation and wherein said emulsion-forming preparation contains at least one hair-care active constituent, at least one skin-care cosmetic active constituent, at least one dermatological or pharmaceutical active constituent, hair-firming agent, at least one hair colorant or at least one permanent wave agent.

49. (currently amended) A static micromixer for mixing two or more constituents to form a mixture immediately prior to use of the mixture, said static micromixer comprising at least one component in the form of a disk (1), and

wherein said disk (1) is provided with at least one inlet opening (2) disposed in a plane of said disk for introduction of at least one feed stream into a linking channel (3) and with at least one outlet opening (4) disposed in the plane of said disk for outflow of the feed stream into a mixing zone (5), said at least one inlet opening (2) being connected with said at least one outlet opening (4) in a communicating manner via said linking channel (3) which is disposed in the plane of said disk; and

wherein said linking channel (3) is divided once by microstructure units (6) into two or more part channels (7) before immediately prior to opening into the mixing zone (5),

and each of the part channels (7) has a respective width in a millimeter to sub-millimeter range and said width is smaller than a width of the mixing zone (5).

50. (new) A packaging system for in-situ preparation of a formulation from at least two constituents, in which said at least two constituents are separately stored until said formulation is prepared, wherein said packaging system comprises at least two separate storage chambers for storing said at least two constituents separately and at least one static micromixer for mixing said at least two constituents to prepare the formulation;

wherein said at least one static micromixer comprises at least one component in the form of a disk (1);

wherein said disk (1) is provided with at least one inlet opening (2) disposed in a plane of said disk for introduction of at least one feed stream into a linking channel (3) and with at least one outlet opening (4) disposed in the plane of said disk for outflow of the feed stream into a mixing zone (5), said at least one inlet opening (2) being connected with said at least one outlet opening (4) in a communicating manner via said linking channel (3) which is disposed in the plane of said disk; and

wherein said linking channel (3) is divided once by microstructure units (6) into more than two part channels (7) immediately prior to opening into the mixing zone (5), and each of the part channels (7) has a respective width in a millimeter to sub-millimeter range and a length that is sufficient for flow control but which minimizes pressure for a given throughput and said width is smaller than a width of the mixing zone (5).

51. (new) The packaging system as defined in claim 50, wherein a length-to-width ratio of each of the part channels (7) is 8:1 to 12:1 and a width of each of the part channels (7) is from 5 μm to 250 μm .